the distribution of temperature in each of the reaction units with respect to the direction of flow of the gas. In other words, in each of the reaction units, the temperature difference tends to be created in a direction conforming to the direction of flow of the gas in such a way that, for example, since in the reforming reaction unit 2 an endothermic reaction takes place, the temperature on a leeward side tends to lower whereas since in the shift reaction unit 4 and the CO oxidizing unit 4 an exothermic reaction takes place, the temperature on a windward side tends to increase. The heat conductive material 19 provided on the respective surfaces of the reaction units serves to uniformalize this temperature difference by heat conduction. The surface material of the reaction units, although sufficient if it has a high heat conductivity, is used in the form of, for example, stainless steel in view of the fact that corrosion resistance and durability are required as well and, in contrast thereto, the heat conductive material 19 is employed in the form of copper or aluminum. Although they are inferior in that the heat resistance and the strength are lower than those of the stainless steel, they are excellent in heat conductivity.

IN THE CLAIMS

Please amend claims 1-7, 10-15, 18-21, 29 and 30 by replacing these claims with the following amended claims, with a marked up copy of the claims being attached to the Office Action.

1. (Twice Amended) A reforming apparatus comprising an integrated structure of three separate units, comprising:

a raw material reforming unit for steam-reforming a raw material to be reformed and producing a reformed gas containing hydrogen as a principal component, including a heat source that

generates heat by combustion of a fuel gas, operable to directly obtain heat for the steam reformation reaction from said heat source;

a shift reaction unit for decreasing, by water-gas-shift reaction, CO contained in the reformed gas produced in said raw material reforming unit; and

a CO oxidation unit for further decreasing, by oxidation, CO contained in reformed gas treated in said shift reaction unit; and

said raw material reforming unit and said shift reaction unit contain different catalysts, and said shift reaction unit and said CO oxidation unit being arranged in a manner that said shift reaction unit and said CO oxidation unit can be indirectly heated by heat transfer from the heat source of said raw material reforming unit, and further said CO oxidation unit including an outside surface, and being arranged to obtain atmospheric cooling of the outside surface.

2. (Amended) The reforming apparatus according to claim 1, wherein said raw material reforming unit, said shift reaction unit and said CO oxidization unit are concentrically arranged relative to each other with said CO oxidization unit placed on an outer peripheral side of the reforming apparatus.

3. (Amended) The reforming apparatus according to claim 2, wherein said raw material reforming unit comprises a generally cylindrical combustion chamber as the heat source and a reforming reaction unit for steam-reforming the raw material to produce the reformed gas containing hydrogen as a principal component, said reforming reaction unit, said shift reaction unit and said CO oxidation unit are concentrically arranged relative to said combustion chamber.

4. (Amended) The reforming apparatus according to claim 3, wherein said reforming reaction unit is concentrically accommodated within said combustion chamber.

4. (Amended) The reforming apparatus according to claim 3, wherein said reforming reaction unit is positioned outside said combustion chamber in contact therewith.

C7 5. (Twice Amended) The reforming apparatus according to claim 3, said combustion chamber comprising a center, and further comprising an incombustible core arranged at the center of said combustion chamber.

6. (Twice Amended) The reforming apparatus according to claim 3, wherein both of said shift reaction unit and said CO oxidation unit are positioned outside said reforming reaction unit.

9. (Twice Amended) The reforming apparatus according to claim 7, wherein said shift reaction unit is arranged on a side adjacent to a high temperature zone of said reforming unit and said CO oxidation unit is arranged on a side adjacent a low temperature side of said reforming reaction unit, so as to be in conformity to a temperature distribution within said reforming reaction unit.

10. (Twice Amended) The reforming apparatus according to claim 1, wherein each of said

C8 shift reaction unit and said CO oxidation unit is arranged in a position which is heated by a burned exhaust gas from said heat source of said raw material reforming unit.

12. (Twice Amended) A reforming apparatus comprising an integrated structure of three separate units, comprising:

a raw material reforming unit for steam-reforming a raw material to be reformed and producing a reformed gas containing hydrogen as a principal component, including a heat source that generates heat by combustion of a fuel gas, operable to directly obtain heat for the steam reformation reaction from said heat source;

a shift reaction unit for decreasing, by water-gas-shift reaction, CO contained in the reformed gas produced in said raw material reforming unit; and

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a CO oxidation unit for further decreasing, by oxidation, CO contained in reformed gas treated in said shift reaction unit;

said raw material reforming unit and said shift reaction unit contain different catalysts, and said shift reaction unit and said CO oxidation unit being arranged in a manner that said shift reaction unit and said CO oxidation unit can be indirectly heated by heat transfer from the heat source of said raw material reforming unit, and further said CO oxidation unit being arranged in a position outside said raw material unit;

said raw material reforming unit comprising a generally cylindrical combustion chamber as the heat source and a reforming reaction unit for steam-reforming the raw material to produce the reformed gas containing hydrogen as a principal component, said reforming reaction unit, said shift reaction unit and said CO oxidation unit are concentrically arranged relative to said combustion chamber; and

further comprising an exhaust chamber, in which a burned exhaust gas from said combustion chamber directly flows, wherein said exhaust chamber is positioned adjacent to and coaxially above said combustion chamber, said shift reaction unit being positioned outside said exhaust chamber, said CO oxidation unit being positioned outside said shift reaction unit.

13. (Amended) The reforming apparatus according to claim 12, further comprising an air intake for introducing fresh air inbetween said combustion chamber and said exhaust chamber.

14. (Twice Amended) The reforming apparatus according to claim 12, further comprising a secondary heating element for heating said exhaust chamber.

15. (Twice Amended) The reforming apparatus according to claim 12, further comprising an exhaust vent for discharging the burned exhaust gas in said exhaust chamber to the outside, a

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shutter for selectively opening and closing said exhaust vent, a first duct which is separated from said exhaust chamber and interposed between said shift reaction unit and said CO oxidation unit, and a second duct which is fluid-connected with said first duct and positioned outside said CO oxidation unit.

18. (Twice Amended) A reforming apparatus comprising an integrated structure of three separate units, comprising:

a raw material reforming unit for steam-reforming a raw material to be reformed and producing a reformed gas containing hydrogen as a principal component, including a heat source that generates heat by combustion of a fuel gas, operable to directly obtain heat for the steam reformation reaction from said heat source;

a shift reaction unit for decreasing, by water-gas-shift reaction, CO contained in the reformed gas produced in said raw material reforming unit; and

a CO oxidation unit for further decreasing, by oxidation, CO contained in reformed gas treated in said shift reaction unit;

said raw material reforming unit and said shift reaction unit contain different catalysts, and said shift reaction unit and said CO oxidation unit being arranged in a manner that said shift reaction unit and said CO oxidation unit can be indirectly heated by heat transfer from the heat source of said raw material reforming unit, and further said CO oxidation unit being arranged in a position outside said raw material unit;

said raw material reforming unit comprising a generally cylindrical combustion chamber as the heat source and a reforming reaction unit for steam-reforming the raw material to produce the reformed gas containing hydrogen as a principal component, said reforming reaction unit, said shift

reaction unit and said CO oxidation unit are concentrically arranged relative to said combustion chamber; and

at least one of said reforming reaction unit, said shift reaction unit and said CO oxidation unit is provided on a surface thereof with a heat transfer material having a higher heat conductivity than that of a material of which said surface is composed.

19. (Twice Amended) The reforming apparatus according to claim 2, wherein said CO oxidation unit includes fins for heat dissipation on an outer surface thereof.

20. (Twice Amended) A reforming apparatus comprising an integrated structure of three separate units, comprising:

a raw material reforming unit for steam-reforming a raw material to be reformed and producing a reformed gas containing hydrogen as a principal component, including a heat source that generates heat by combustion of a fuel gas, operable to directly obtain heat for the steam reformation reaction from said heat source;

a shift reaction unit for decreasing, by water-gas-shift reaction, CO contained in the reformed gas produced in said raw material reforming unit; and

a CO oxidation unit for further decreasing, by oxidation, CO contained in reformed gas treated in said shift reaction unit;

said raw material reforming unit and said shift reaction unit contain different catalysts, and said shift reaction unit and said CO oxidation unit being arranged in a manner that said shift reaction unit and said CO oxidation unit can be indirectly heated by heat transfer from the heat source of said raw material reforming unit, and further said CO oxidation unit being arranged in a position outside said raw material unit;

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said raw material reforming unit comprising a generally cylindrical combustion chamber as the heat source and a reforming reaction unit for steam-reforming the raw material to produce the reformed gas containing hydrogen as a principal component, said reforming reaction unit, said shift reaction unit and said CO oxidation unit are concentrically arranged relative to said combustion chamber; and

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further comprising a main exhaust chamber in which a burned exhaust gas from said combustion chamber directly flows, a main exhaust vent for directly discharging the burned exhaust gas in said main exhaust chamber to the outside, a shutter for selectively opening and closing said main exhaust vent, a first duct which is separated from said main exhaust chamber and fluid-connected thereto and is positioned outside said main exhaust chamber, and a second duct which is fluid-connected with said first duct and positioned outside said first duct, said shift reaction unit being placed in said first duct, said CO oxidation unit being placed in said second duct.

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21. (Amended) The reforming apparatus according to claim 20, further comprising an exhaust sub-vent for discharging a burned exhaust gas within said first duct to the outside, and a shutter for selectively opening and closing said exhaust sub-vent.

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29. (Twice Amended) The reforming apparatus according to claim 1, further comprising a combustion catalyst held in said heat source and a preheater for preheating the combustion catalyst, wherein the heat source of said raw material reforming unit generates heat by catalytic combustion.

30. (Twice Amended) A reforming apparatus comprising an integrated structure of four separate units, which comprises:

a combustion unit for generating heat by combustion of a fuel gas;

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